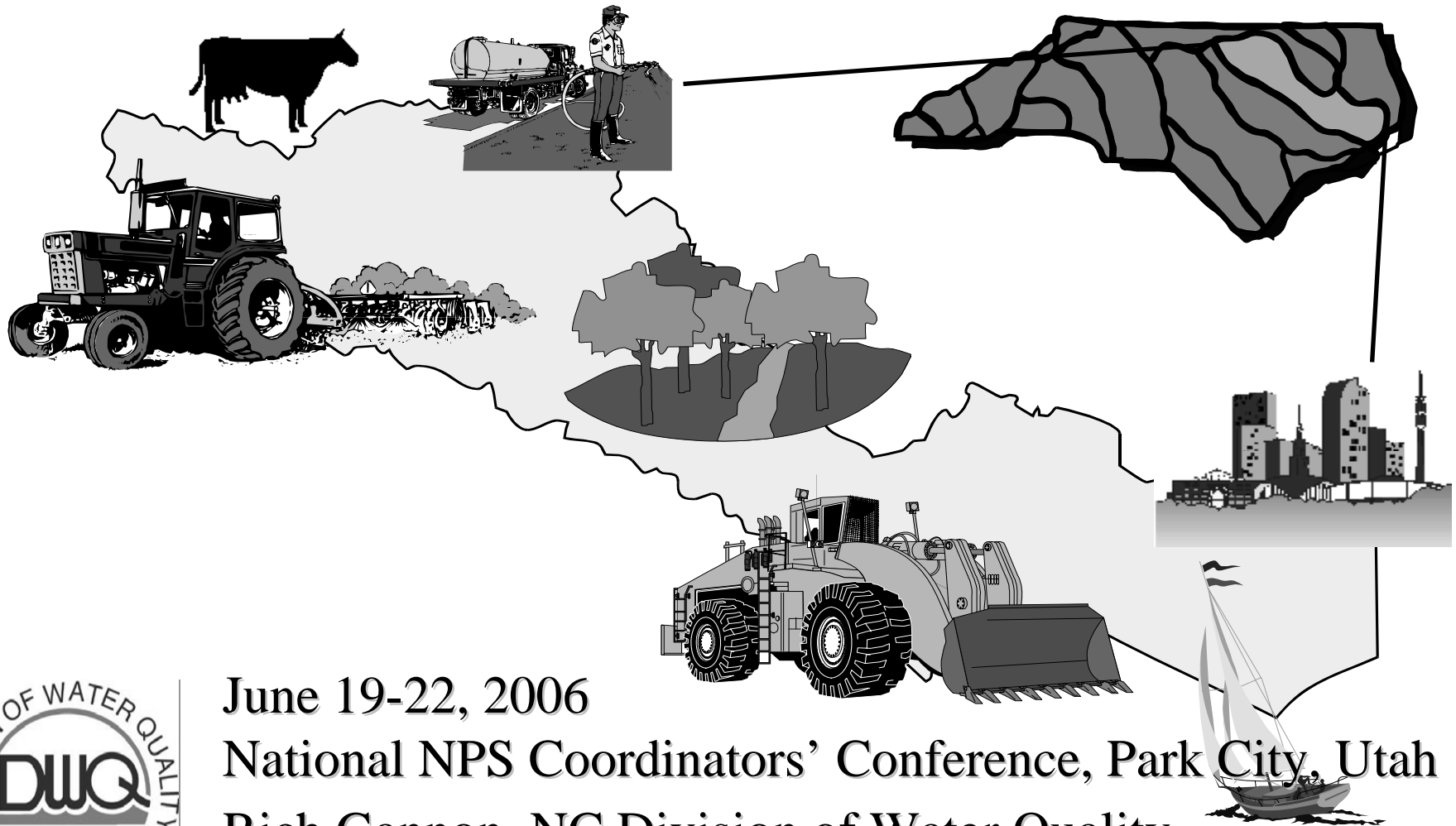


Tar-Pamlico Nutrient Strategy: A Large-Scale Watershed Restoration



June 19-22, 2006

National NPS Coordinators' Conference, Park City, Utah

Rich Gannon, NC Division of Water Quality

Talk Outline

- Basin and strategy overview
- Accounting
- Progress
- Hindsight

Insights for Mandatory Restoration Strategies

- Adequate planning time. For:
- Buy-in on problem & contributors is key
- Create options with affected parties
- Inclusive, fair, open *process*
- Inclusive, equitable & workable *outcomes*
 - Performance goals
 - Maximize options
- Reality check: dual accounting

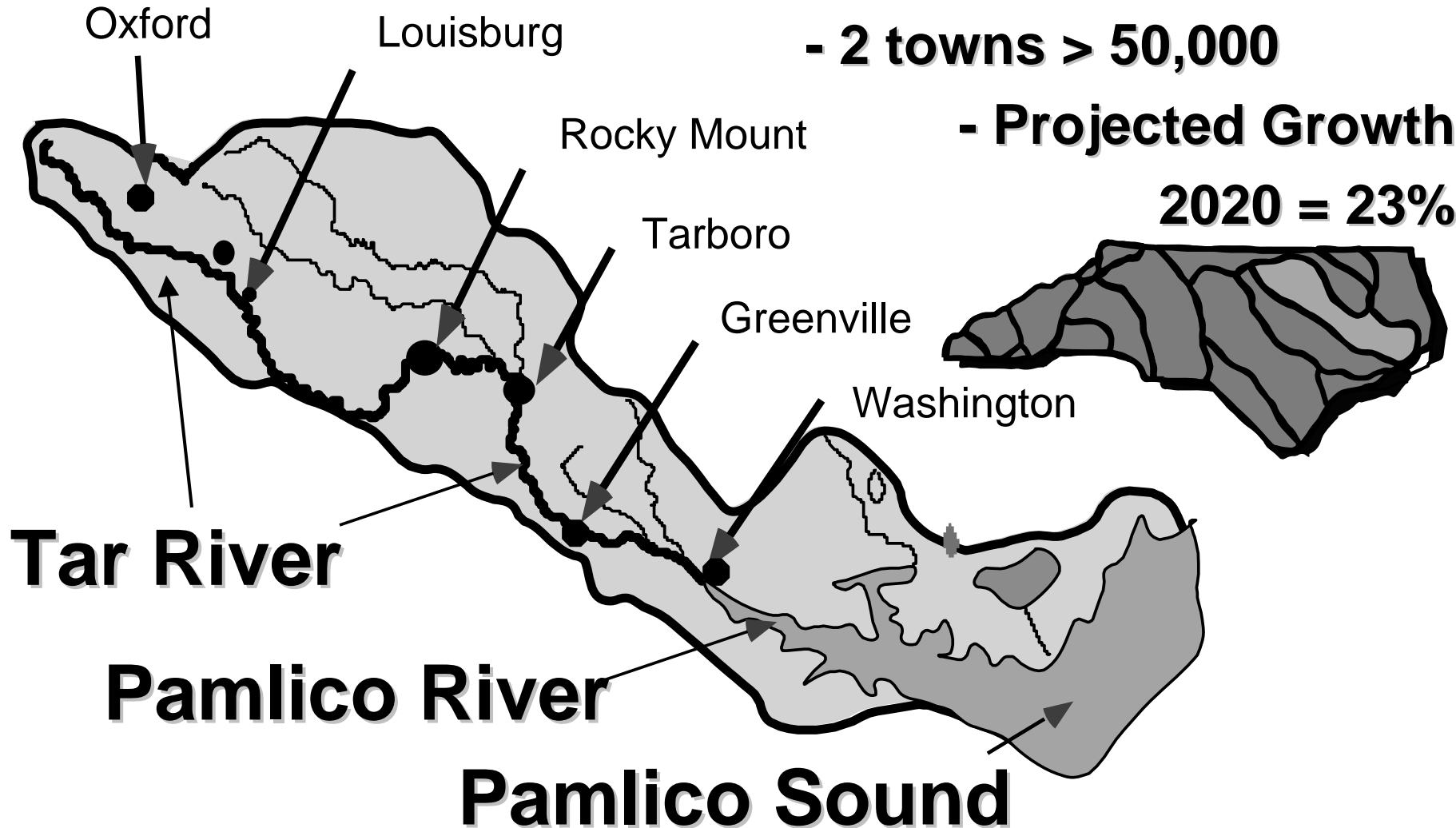
TAR-PAMLICO RIVER BASIN

- 5,400 mi², Population 415,000

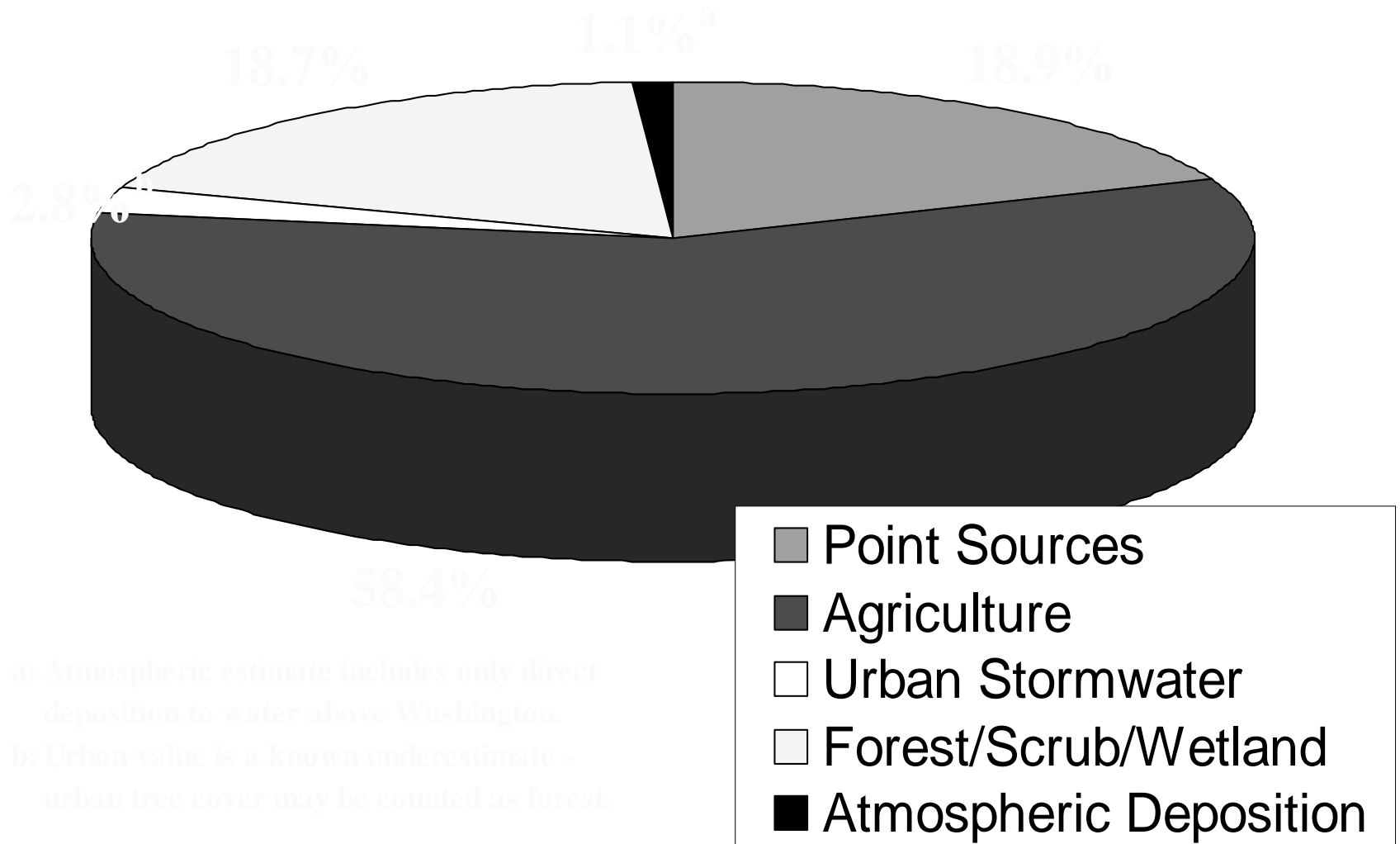
- 2 towns > 50,000

- Projected Growth

2020 = 23%



Sources of Nitrogen to Pamlico River (% of N Load at Washington)





Tar-Pamlico Nutrient Strategy

1989 “Nutrient Sensitive Waters”

1990 Point source cap, ‘trading’

1995 Phase II:

- Estuary goals: 30% N ↓, no P ↑
- Refined point source caps, trading
- Voluntary NPS plan

2000-2001 NPS rules:

- *Riparian Buffer Protection*
- *Urban Stormwater*
- *Fertilizer Management*
- *Agriculture*

**2005 Phase III: restore estuary
by 2013**

Tar-Pamlico Nutrient Strategy

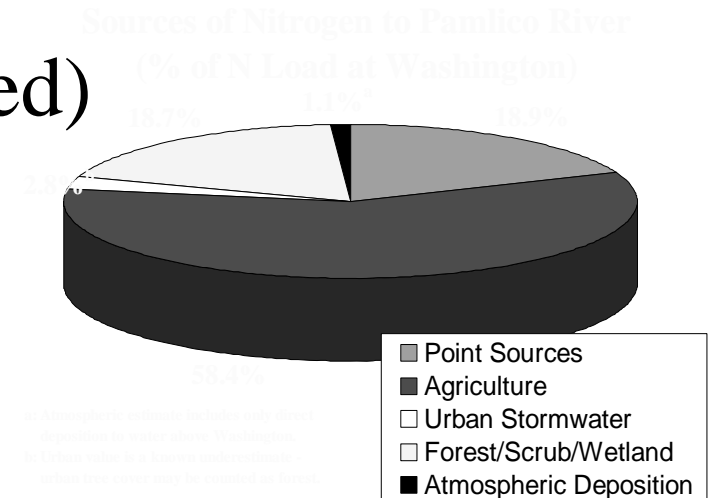
Noteworthy Features

- Dischargers & enviro's originated
- Estuary N, P loading goals & allocations
- Point source caps, offset to ag BMPs
- Innovative cropland regulation
- Clean-up deadline

Buy-In on Problem?

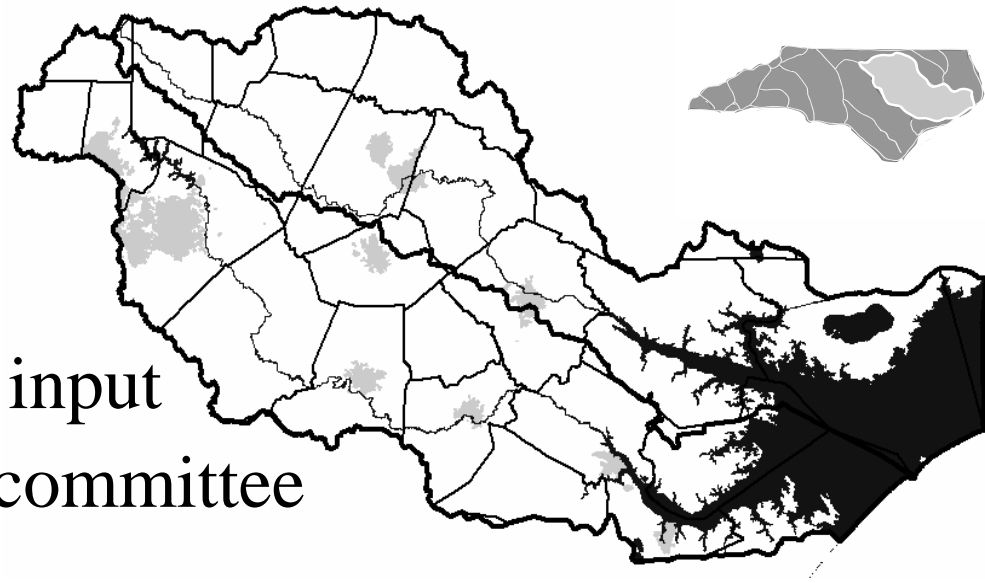


- Late '80's – yes
(highly visible)
 - Agreement reflected strong collaboration
- Late '90's – no (crisis passed)
 - Rules harder to adopt



Planning Stages

- Template (Neuse):
 - 2+ yrs, 2 rounds public input
 - Legislated stakeholder committee
- Tar rulemaking process – 3 yrs:
 - Draft rules - 8 stakeholder teams
 - Hearing Officer-stakeholder deliberations 1 yr.
 - Legislative arbitration process 6 mo.
- Implementation – 1st 2 yrs developed model & accounting



Nonpoint Source Rules

Tar-Pamlico Nutrient Strategy

❶ Agriculture

- 30% ↓ N loss in 5 years or else EMC
- No ↑ P
- Local control, local responsibility
- Option: standard BMPs or collective fate
- 'Land-based' accounting - annual reports

❷ Fertilizer Management

- Applicators - training or plans in 5 years
- Homeowners - DWQ education program

Nonpoint Source Rules

Tar-Pamlico Nutrient Strategy

③ Riparian Buffer Protection

- All land uses
- Existing 50-ft veg'd buffers
- Pre-existing uses continue
- Change in use?
 - Must establish buffer

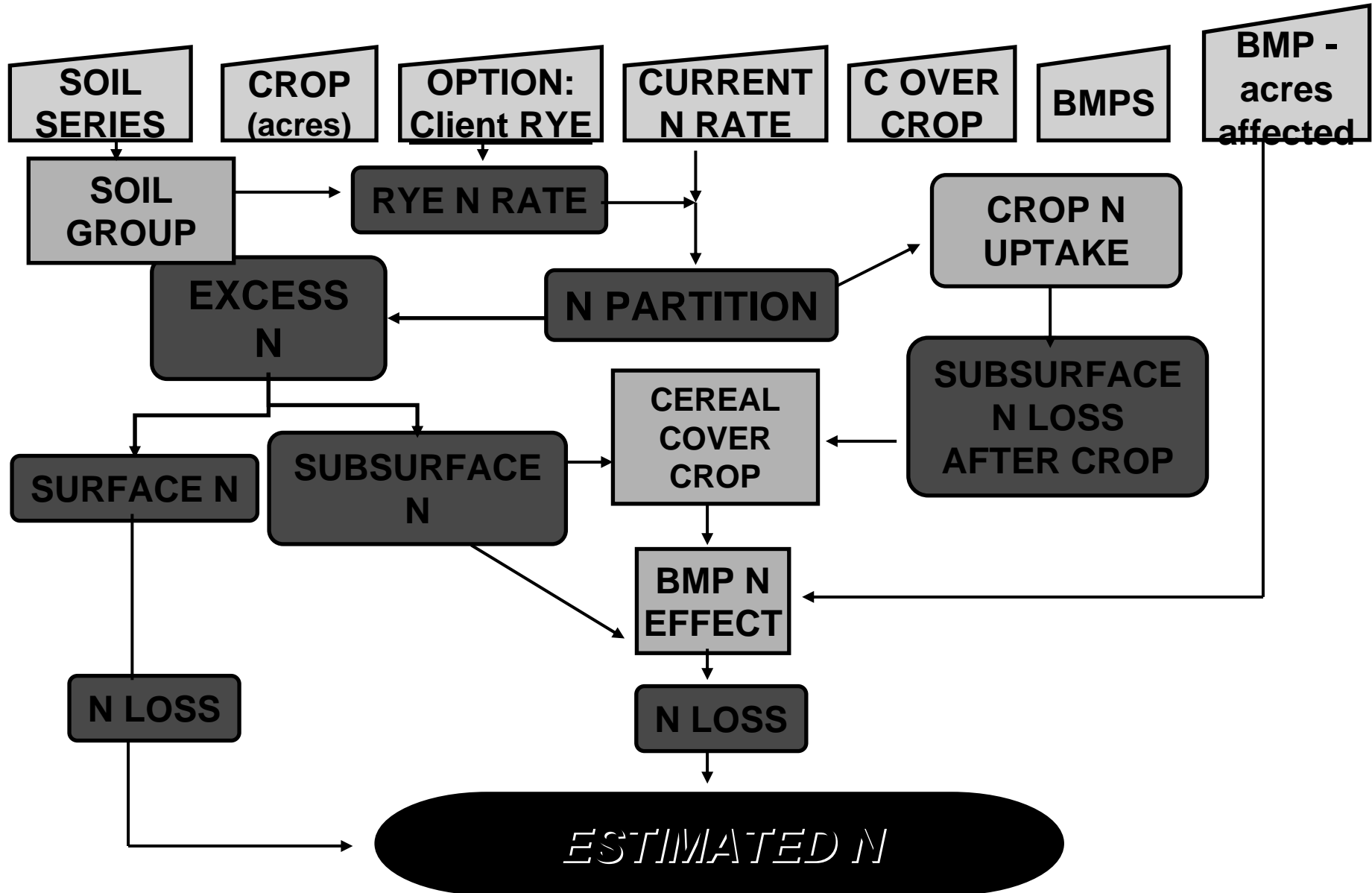
④ Urban Stormwater

11 key local governments

- New development meets export targets
- Illicit discharge detection/removal
- Education programs & seek retrofits



Agricultural Nitrogen Loss Accounting Tool



Agricultural N Loss Reductions from 1991



	<u>2003</u>	<u>2004</u>
N Rate Decreases	23.0	22.5
Crop Shifts	11.6	11.8
BMPs	5.1	6.5
Crop Acreage Reduction	<u>7.1</u>	<u>6.3</u>
Total N Loss Reduction	47%	47%

Stormwater Export

Coastal Plain of the Tar-Pamlico River Basin:

Includes Greenville and Washington as well as Pitt and Beaufort Counties

BMP Removal Calculation Worksheet (Automated)

Project Name:						
Date:						
By:				Checked By:		

Directions:

> It may be advantageous to split the development into separate catchments to be handled by separate BMPs. The tables below allow the development to be split into as many as three catchments, and can be copied for greater than three. NOTE: Unless runoff

> **Above each table:** Enter the catchment acreage in the top green blank. Based on a comparison of the post-development TN and TP export coefficients you calculated above to the rule requirements of 4.0 lb/ac/yr TN and 0.4 lb/ac/yr TP, select a BMP or BMPs

> **Catchment Tables:** Enter the acres of each type of land cover in the green boxes. The spreadsheet will calculate all of the light blue boxes. NOTE: Compare the Total Catchment Acreage for the Development (final table) to the value you established in th

			TN	TP		
BMP		Wet Detention Pond	25	40		
		Stormwater Wetland	40	35		
Nutrient						
Removal		Sand Filter	35	45		
		Bioretention	40	35		
Rates		Grass Swales	20	20		
		Vegetated Filter Strip w/ Level Spreader	30	30		

Catchment 1:

Total acreage of catchment 1 =		ac				
First BMP's TN removal rate =		%	First BMP's TP removal rate =		%	
Second BMP's TN removal rate =		%	Second BMP's TP removal rate =		%	
TOTAL TN REMOVAL RATE =	0	%	TOTAL TP REMOVAL RATE =	0	%	

(1) Type of Land Cover	(2) Catchment Acreage	(3) S.M. Formula (0.51 + 9.1 I)	(4) Average EMC of TN (mg/L)	(5) Column (2) * (3) * (4)	(6) Average EMC of TP (mg/L)	(7) Column (2) * (3) * (6)
Transportation impervious			2.60		0.40	
Roof impervious			1.95		0.15	
Managed pervious			1.42		0.31	
Wooded pervious			0.94		0.14	
Area taken up by BMP			1.95		0.15	

Catchment 2:

Total acreage of catchment 2 =		ac				
First BMP's TN removal rate =		%	First BMP's TP removal rate =		%	
Second BMP's TN removal rate =		%	Second BMP's TP removal rate =		%	
TOTAL TN REMOVAL RATE =	0	%	TOTAL TP REMOVAL RATE =	0	%	

(1) Type of Land Cover	(2) Catchment Acreage	(3) S.M. Formula (0.51 + 9.1 I)	(4) Average EMC of TN (mg/L)	(5) Column (2) * (3) * (4)	(6) Average EMC of TP (mg/L)	(7) Column (2) * (3) * (6)
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Roof impervious			1.95		0.15	
Managed pervious			1.42		0.31	
Wooded pervious			0.94		0.14	
Area taken up by BMP			1.95		0.15	
Fraction Impervious (I) =			Pre-BMP TN Load (lb/yr) =		Pre-BMP TP Load (lb/yr) =	
Total Area of Development =			Pre-BMP TN Export (lb/ac/yr)		Pre-BMP TP Export (lb/ac/yr)	
			Post-BMP TN Load (lb/yr) =		Post-BMP TP Load (lb/yr) =	
			Post-BMP TN Export (lb/ac/yr)		Post-BMP TP Export (lb/ac/yr)	

Catchment 3:

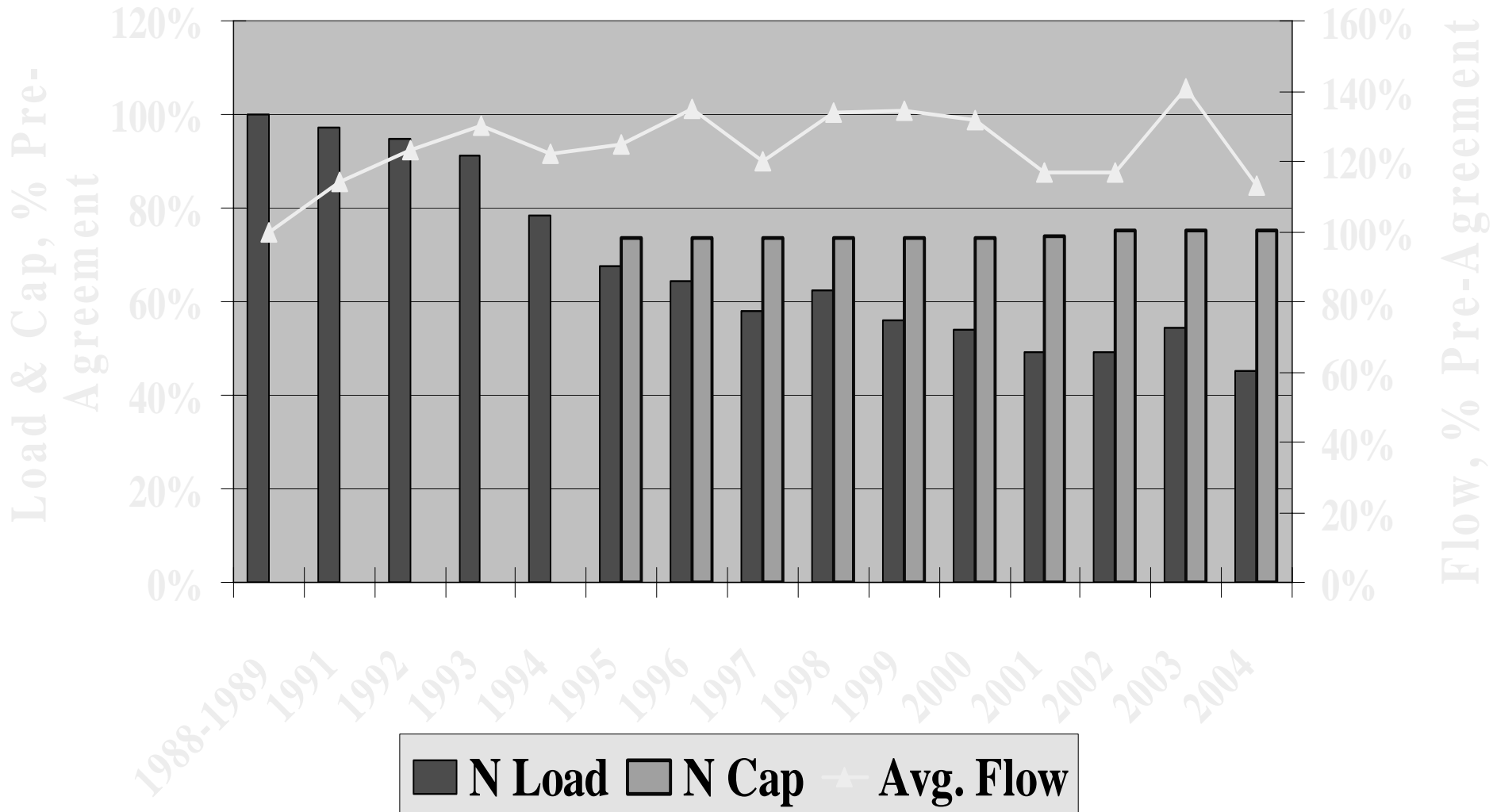
Total acreage of catchment 3 =		ac				
First BMP's TN removal rate =		%	First BMP's TP removal rate =		%	
Second BMP's TN removal rate =		%	Second BMP's TP removal rate =		%	
TOTAL TN REMOVAL RATE =	0	%	TOTAL TP REMOVAL RATE =	0	%	

(1) Type of Land Cover	(2) Catchment Acreage	(3) S.M. Formula (0.51 + 9.1 I)	(4) Average EMC of TN (mg/L)	(5) Column (2) * (3) * (4)	(6) Average EMC of TP (mg/L)	(7) Column (2) * (3) * (6)
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			Post-BMP TN Load (lb/yr) =		Post-BMP TP Load (lb/yr) =	

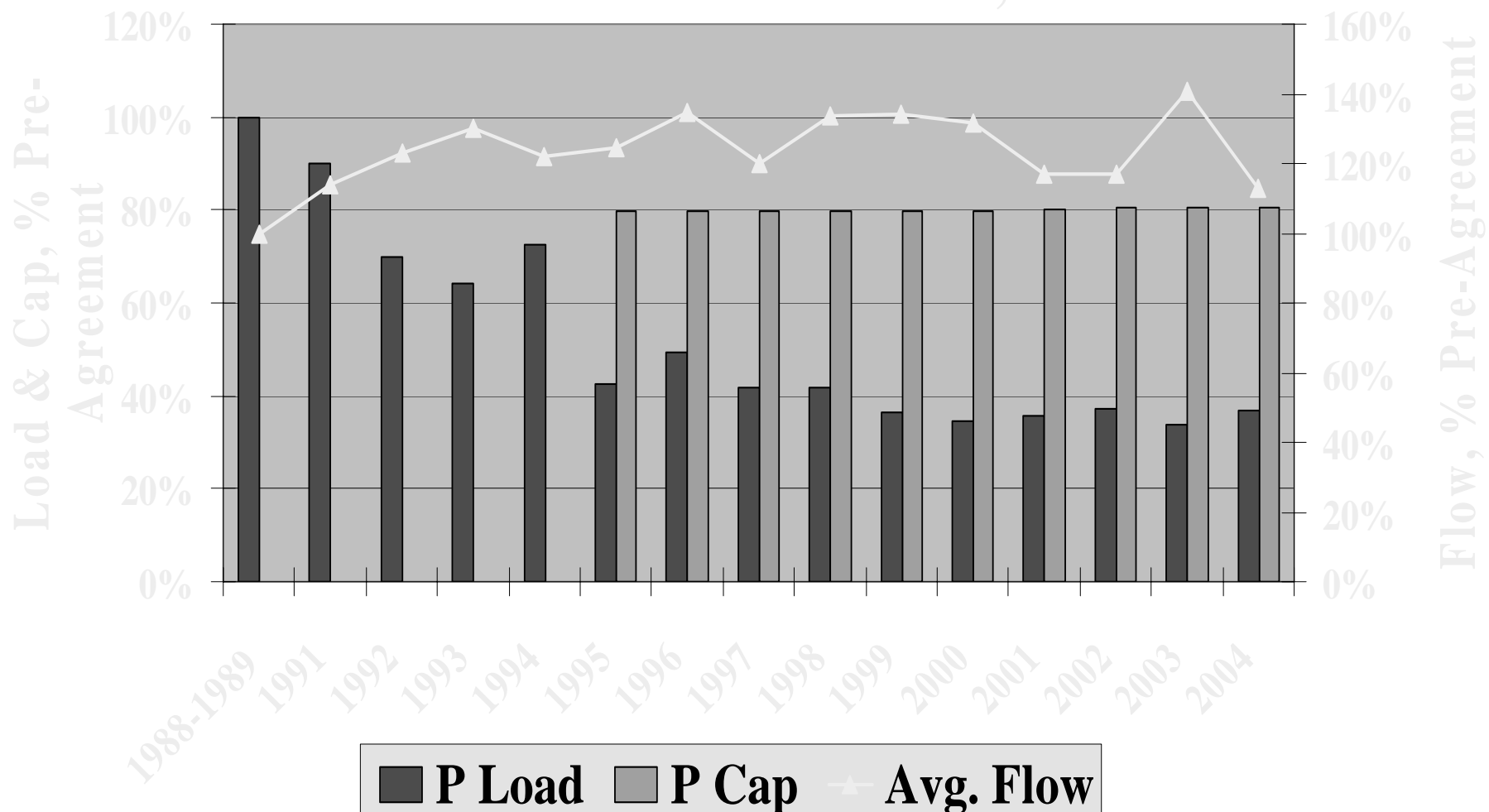
Weighted Average of Nutrient Loadings from the Catchments:

	Catchment Acreage	Post-BMP TN Loading (lb/ac/yr)	Post-BMP TP Loading (lb/ac/yr)			
Catchment 1	0.00	0.00	0.00			
Catchment 2	0.00	0.00	0.00			
Catchment 3	0.00	0.00	0.00			
TOTAL FOR DEVELOPMENT	0.00	0.00	0.00			

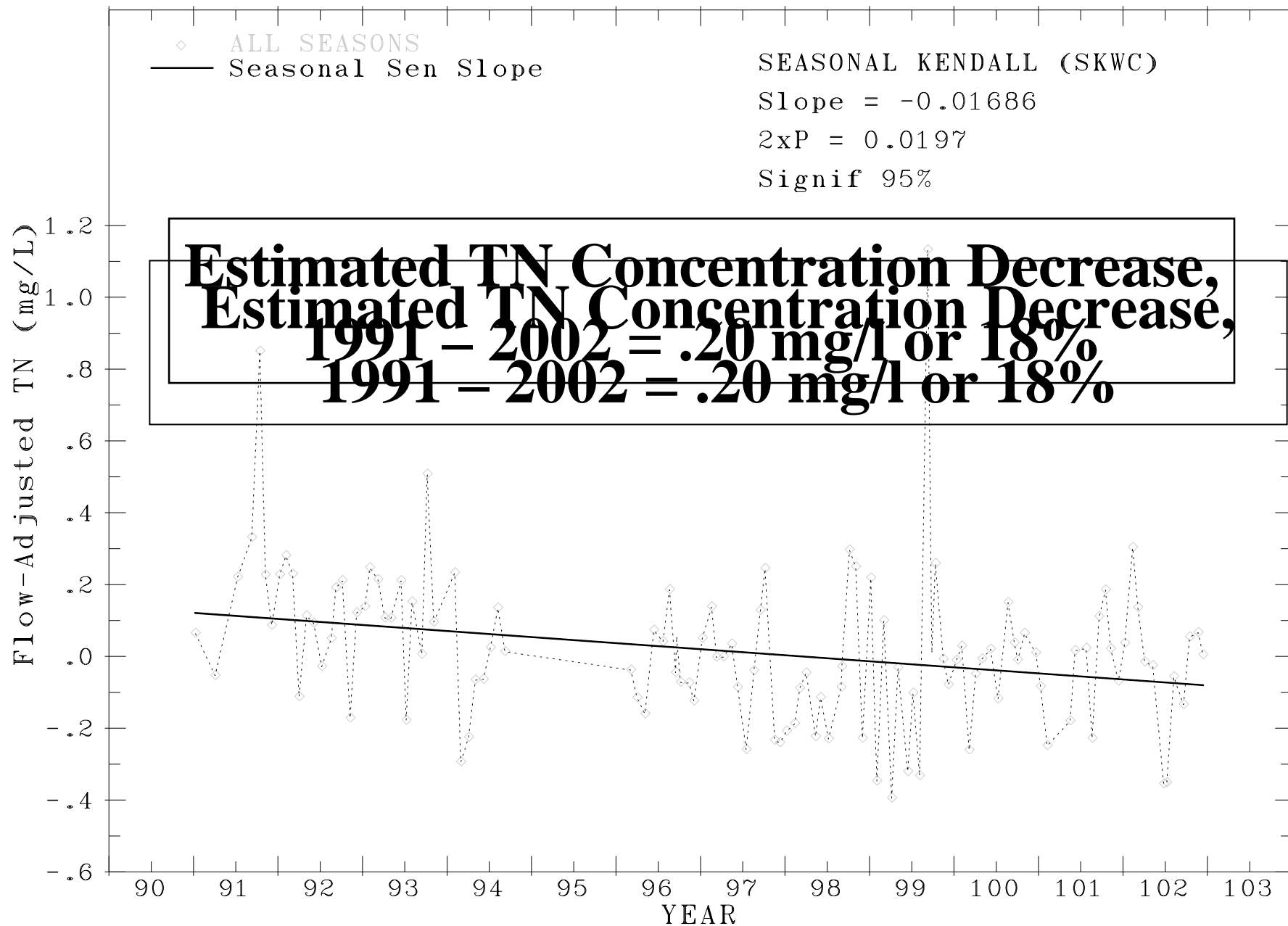
Point Source Association Nitrogen Loads, Tar-Pamlico River Basin, NC



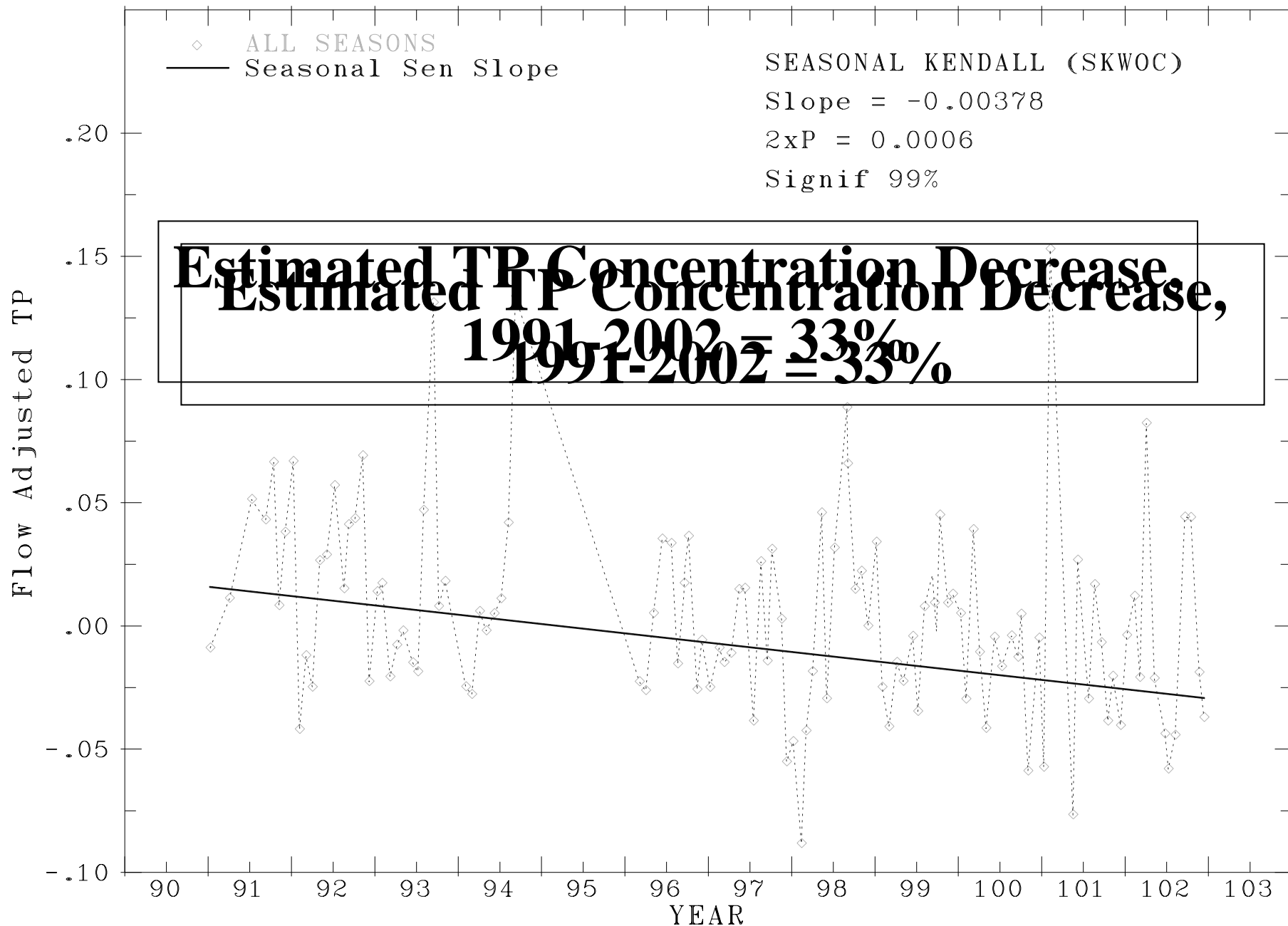
Point Source Association Phosphorus Loads, Tar-Pamlico River Basin, NC



Grimesland

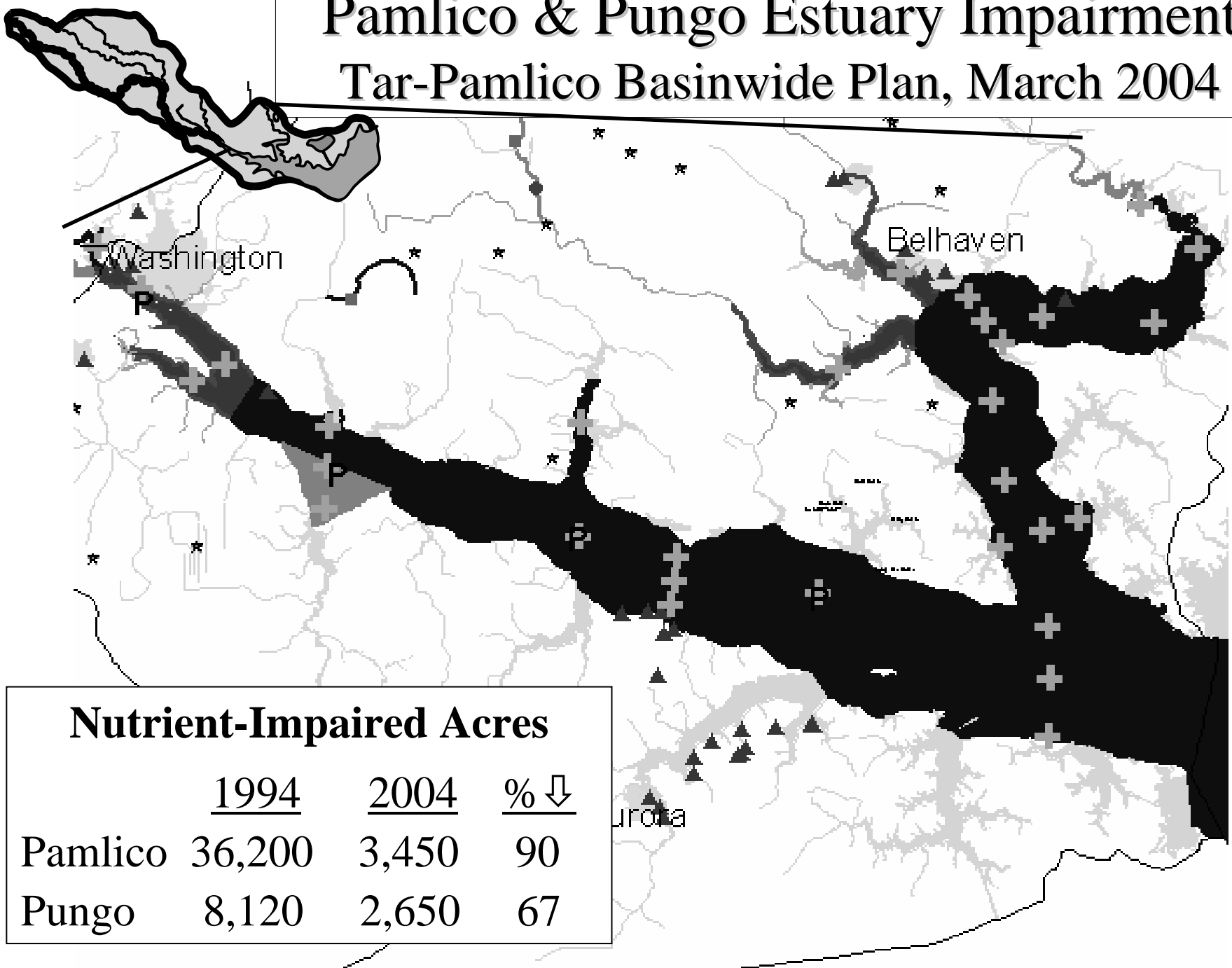


Grimesland



Pamlico & Pungo Estuary Impairment

Tar-Pamlico Basinwide Plan, March 2004



Insights for Mandatory Restoration Strategies

- Adequate planning time. For:
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- Inclusive, equitable & workable *outcomes*
 - Performance goals
 - Maximize options
- Reality check: dual accounting

More Information

Tar-Pamlico Nutrient Strategy

<http://h2o.enr.state.nc.us/nps/tarpam.htm>

Neuse Nutrient Strategy

http://h2o.enr.state.nc.us/nps/Neuse_NSW_Rules.htm

***Draft* Jordan Lake Nutrient Strategy**

Report to October 2005 Water Quality Committee:

<http://h2o.enr.state.nc.us/admin/>

Stakeholder Process, More Documents:

<http://www.tjcog.dst.nc.us/jorlak/jlsp.htm>

DWQ staff contact: Rich Gannon

919-733-5083 ext. 356, rich.gannon@ncmail.net

N Cost-Effectiveness Comparison

Practice	\$/lb Reduced (30-Yr. Life Equiv.)
Agriculture	
• Water Control Structure	\$1.20
• Nutrient Management	\$7 - \$9
• Vegetated Filter Strip	\$7 - \$8
• Conservation Tillage	\$20 - \$80
Riparian Wetland Restoration	\$11 - \$20
Stormwater Wet Det. / Bioret.	\$57 - \$86